THE AMERICAN
JOURNAL OF PHARMACY

NOVEMBER, 1910

DWARF SUMACH, RHUS MICHAUXII.

RHUS MICHAUXII—A NON-POISONOUS PLANT.*

By L. E. Warren.

Numerous plants are known which occasionally cause inflammatory conditions when brought in contact with the human skin. While the majority of these are but slightly poisonous to most individuals and some, like the ladyslipper[1] and the Indian pipe,[2] are irritant only to the most sensitive skins there are a few which so generally cause untoward symptoms that they are ordinarily considered venomous. Although representatives of more than forty families of plants have been accredited with poisonous properties of this nature,[3] the most of those commonly designated as poisonous belong to a single order, the Anacardiaceæ (Cashew family). Representatives of this family occur in great numbers in the Tropics and are found less abundantly in all of the temperate regions of the globe. Many genera in the Cashew family contain poisonous species, the genus Rhus probably claiming as many as any other.

About 120 species of Rhus are known,[4] but of these only about 20 are thought to be poisonous. All of the venomous species contain a viscid, pale cream-colored, emulsion-like juice, which

* We are indebted to Prof. William Trelease, Director of the Missouri Botanical Garden, for the use of the electrotype showing the habit of *Rhus Michauxii,* and which was used to illustrate an article in Volume XX, Report of the Missouri Botanical Garden.—Editor.

[1] Babcock, H. H.: *The Pharmacist,* **8,** 1 (1875); also A. Ph. A. Proc., **23,** 137 (1875). MacDougal, D. T.: *Gard. & For.,* **9,** 40 (1896).

[2] Young, A. H.: *Bot. Gaz.,* **3,** 37 (1878).

[3] White, J. C.: "Dermatitis Venenata," 29 (1887).

[4] Britton and Brown: Ill. Flor., **2,** 386 (1897).

contains the poisonous principle as its chief ingredient. Through an oxidizing process engendered by an enzyme this juice begins to darken at once on exposure to air and eventually becomes converted into a black, lustrous, exceedingly durable varnish which, in Oriental countries, is much esteemed. An alcoholic extract of the juice contains the poisonous principle and gives characteristic precipitates or colorations with alcoholic solutions of certain metallic salts.

In a recent compilation of the poisonous species of Rhus [5] by the author it was noted that while further exploration might increase the number already known, additional investigation might eliminate some already classed with the venomous species. The question of the poisonous properties of one of the species, *Rhus Michauxii,* has been under discussion for nearly a century.

Rhus Michauxii or dwarf sumac, the smallest and least common of all the sumacs, is a shrub with stout, erect stems from one to three feet in height. It is a rare and little known plant, found only in limited areas in the sandy soils of Georgia and the Carolinas. The deciduous, compound leaves are from 12 to 14 inches in length, with from 7 to 13 lanceolate or ovate, very short stalked, coarsely serrate, pubescent leaflets. The flowers are very small and inconspicuous, growing thickly in a dense panicle which is about 6 inches long by nearly 3 broad. The fruit is a one-seeded, nearly globose drupe, about an eighth of an inch in diameter, clothed with a close pubescence of short, stout, crimson hairs.

Rhus Michauxii Sarg. (*R. pumilum* Michx.) [*Schmaltzia Michauxii* (Sarg.) Small] was first described by Andre Michaux,[6] a distinguished French traveler and botanist, who visited this country late in the eighteenth century. While Michaux has left an accurate description of the plant he makes no mention [7] of any venomous properties in connection with it. This omission is significant, since

[5] Warren, L. E.: *Pharm. Jour.,* **83,** 531 (1909).

[6] Michaux, A.: Flor. Bor. Am., 1, 182 (1803).

[7] Michaux's work, the "Flora Boreali Americana," was not published until after his death. Most of the plant descriptions were written by the editor, Richard, and were based upon specimens collected by Michaux during his travels and supplemented by notes from his journal. Portions of Michaux's journal, edited by Prof. C. S. Sargent, were published (in French) in the proceedings of the American Philosophical Society in 1889. An English translation of this has also appeared (Thwaites: Early West. Travels, vol. 3, pp. 1–104, 1904).

Michaux was an accurate observer and was familiar with the Indian traditions and local beliefs of the settlers concerning the floras of the regions which he visited.

The first report of the poisonous properties of *Rhus Michauxii* was made by Pursh,[8] who says (of *R. pumilum*):

"Not above a foot high; it is the most poisonous of the genus, according to information from Mr. J. Lyon, who, by collecting the seed of this species, got poisoned all over his body, and was lamed for a considerable time."

Apparently no other evidence concerning the toxicity of this species was available to Pursh. Thus the unsavory reputation under which *R. Michauxii* has labored for more than ninety-five years was acquired from the testimony of a single observer—an individual who, apparently, was neither a physician nor a botanist.

For many years the statement of Pursh remained unchallenged. There were but few works on systematic botany or catalogues of American plants at that day and still fewer existed which were of sufficient scope to include such rare and little known plants as *Rhus pumilum*.[9]

An examination of the botanical works produced between 1815 and 1870 reveals little concerning *R. pumilum* except the copying of Pursh's assertions, although a few writers deny that the plant is poisonous. The following abstracts and excerpts from the literature of that period illustrate the uncertainty concerning the properties of the plant:

"Reported on the authority of Mr. Lyon to be very poisonous."[10] Rafinesque classes *R. pumilum* with the poisonous species but gives no individual description of it.[11] It is quite probable that he had no personal knowledge of the species for, although he had traveled extensively through the eastern portion of the United States, it does

[8] Pursh, F.: Flor. Am. Sep., **1**, 204 (1814).

[9] In the Journal of Michaux's travels, edited by Prof. C. S. Sargent (Am. Phil. Soc. Proc., **26**, 132, 1889), this species is mentioned as "*Rhus pumila.*" A specimen was collected or noted by Michaux on April 5, 1796, near Waxsaw Creek in South Carolina. In the "Flora Boreali Americana," the species is called "*Rhus pumilum.*" The latter name was most generally accepted by botanists until Sargent renamed the species in 1895 (*Gard. & For.*, **8**, 404, 1895).

[10] Elliott, S.: Sk. Bot. S. Car. & Ga., **1**, 365 (1821).

[11] Rafinesque, C. S.: Med. Flor., **2**, 257 (1830).

not appear [12] that he had visited the Carolinas or was familiar with the flora of that region.

"Fruit clothed with a red, silky pubescence. Said to be very poisonous." [13]

"It is rather rare but occurs in the lower and middle districts, especially in Mecklenburg where it was discovered by the elder Michaux. Pursh has represented it as being very poisonous, but it is perfectly harmless. . . ." [14]

The opinions of later writers concerning the question are not less contradictory than are those of the earlier ones. Millspaugh mentions that there is a great diversity of opinion concerning its toxic or non-toxic effects.

". . . some writers claiming it to be entirely innocuous, others judge it to be the most poisonous of the North American species, claiming that it will show its effects upon those who are not susceptible to the influence of *R. toxicodendron.*" [15]

The revival of the theory that the species is poisonous appears to be due to Sargent who reports:

"The juices of *R. Michauxii* turn black in drying, like those of several of the species of Rhus. . . . From my limited experience with a partly dried specimen I am inclined to believe that it is the most poisonous of the North American species." [16]

Almost simultaneous with Sargent's publication another authority, Dr. W. W. Ashe, declares with equal emphasis that the plant is innocuous:

"Lyon avers [17] that he was severely poisoned by handling the plant, but it must have been another plant or he was hypersensitive to Rhus poisons. Negro children, where *R. pumila* grows, eat its berries with the same avidity as those of *R. Glabra* or *R. copalina* and experience no symptoms of poisoning." [18]

---

[12] Rafinesque, C. S.: Life and Travels (1836).

[13] Darby, J.: Bot. S. States, Pt. **2**, 254–5 (1857).

[14] Curtis, M. A.: Geolog. & Nat. Hist. Surv. N. Car., **3**, 15 (1867).

[15] Millspaugh, C. F.: Med. Plants, **1**, 36–2 (1892).

[16] Sargent, C. S.: *Gard. & For.*, **8**, 404 (1895).

[17] Ashe, W. W.: Geolog. Surv. N. Car., *Bot. Gaz.*, **20**, 549 (1895).

[18] This in itself would not be presumptive evidence that the species were not poisonous, since the ripe fruit of *R. vernix* and *R. toxicodendron* are known to be non-poisonous. That the fruit is red and agreeably acid strongly indicates, however, that the plant bearing it is most probably non-toxic, for none of the other red-fruited species is venomous while all of the well-known poisonous species bear white or cream-colored fruits rich in fats but free from acid.

Shortly after this Gray and Robinson [19] reviewed portions of the evidence in the case both *pro* and *con*, but arrived at no conclusions.

From the foregoing it can be seen that the recorded evidence favorable to the theory that *R. Michauxii* is poisonous is meagre and is largely of the "hearsay" variety. A critical examination of the evidence shows that but one authority (Sargent) has added anything from personal observation to strengthen the theory, while two others (Curtis and Ashe) have each declared their opinion to the contrary.

From a study of the botanical literature of Rhus species and from an examination of the fruit of several toxic and non-toxic species, the author, several years since, became convinced that *Rhus Michauxii* could not be poisonous. In correspondence with Professor Wm. Trelease, Director of the Missouri Botanical Garden, it was learned that this noted botanist had arrived at the same conclusion. Professor Trelease says:

"Outside of the Toxicodendron group, with the aberrant leaf-scars, buds, and fruits, I have always been somewhat suspicious as to the poisonous properties of sumacs (naturally without failing to give heed at least to a current belief in the poisonousness of other species). For this reason, when I began to grow *R. Michauxii*, ten or fifteen years ago, I took occasion to rub its crushed leaves over my hand and I have several times since repeated the trial without ever suffering the least poisoning, although I am moderately susceptible to the poison ivy, and I am consequently inclined to think that this species is poisonous to only very susceptible individuals, if to any one."

In a later communication he writes:

"It is . . . one of the red-fruited sumacs differing almost generically from the white-fruited poisonous species."

In response to an inquiry as to whether the juice of this species darkens on exposure to the atmosphere (as Sargent had stated) he replied:

"The observation now made is that the nearly colorless sap does not darken as the lacquer varnishes do."

In addition to making observations at the request of the author concerning the plant and its visitors, Professor Trelease kindly

[19] Gray and Robinson: Syn. Flor. N. Am., 1, II, 384 (1895–7).

offered to supply specimens of *Rhus Michauxii* from the Missouri Botanical Garden upon which tests could be made. This was done and the material upon which the tests hereinafter described were carried out was obtained from this source. Having been collected by Professor Trelease from an authentic specimen growing in the Missouri Botanical Garden and shipped under his supervision, there can be no question concerning the identity of the material examined. The author herewith extends his most sincere thanks to Professor Trelease for his courtesies in furnishing the material for examination, for reporting his observations upon the living plant, and for revising the botanical description of *Rhus Michauxii* given elsewhere in this paper.

EXPERIMENTAL WORK.

The first lot of material was received April 11, 1910. It consisted of the ends of several small branches with the leaf buds about to open. One of the twigs was cut in small pieces and thoroughly crushed by bruising in a mortar. The disintegrated material was then triturated with alcohol for some time and the mixture filtered. A portion of the filtrate gave no black color or precipitate when treated with an alcoholic solution of potassium hydroxide. Another portion of the filtrate was allowed to evaporate spontaneously almost to dryness and a drop of the syrupy residue tested for poisonous properties, according to the method (slightly modified) of Tschirch and Stevens.[20] This consists in thoroughly rubbing a drop of the suspected liquid into the integument of the forearm by means of a glass rod, thus covering a circular area about 1 cm. in diameter. After thirty minutes the part treated is washed with ether, then with alcohol, and lastly with soap and water. If the substance were poisonous the area treated will exhibit a noticeable redness and perhaps slight itching after twenty-four to thirty-six hours. If a negative result be obtained the experiment is repeated with the difference that the test material is allowed to remain upon the arm for from one to two hours. In doubtful cases a third experiment continuing through twenty-four hours should be carried out. When tested by the above method the alcoholic extract from the twigs of *Rhus Michauxii* showed absolutely no poisonous properties.

[20] Tschirch and Stevens; *Arch. Pharm.*, **243**, 504 (1905); also Am. Jour. Pharm., **78**, 63 (1906).

A portion of the residue obtained by evaporation of the alcoholic extract of the twigs was dissolved as completely as possible in a small quantity of petroleum ether, the solution filtered, and the filtrate poured with stirring into a large excess of petroleum ether. After standing twenty-four hours the mixture was filtered, the filtrate allowed to evaporate spontaneously, and a drop of the residue tested upon the arm as above described. These tests also proved negative.

A second portion of material (part of an inflorescence) was received July 19, 1910. A part of this material was subjected to the treatment and tests described above and with the same result—absolutely negative.

While these observations and experiments do not absolutely prove *Rhus Michauxii* to be innocuous, the evidence is most convincing and the author is of the opinion that further investigations (should they be made) will but furnish additional evidence in support of Curtis' contention, made forty years ago, that the species is entirely harmless.

BIBLIOGRAPHY.

Michaux, 1803, Flor. Bor. Am., (1) 182. Earliest description of *Rhus pumilum* (now *R. Michauxii*).

Pursh, 1814, Flor. Am. Sep., (1) 204. First account of the poisonous properties of *Rhus pumilum.*

Bigelow, 1820, Am. Med. Bot., (3) 25. "It is said that some other species of Rhus, such as *Rhus pumilum* and *Rhus typhinum,* possess the same (poisonous) property in a greater or less degree."

Elliott, 1821, Sk. Bot. So. Car. & Ga., (1) 362. *R. pumilum* listed as poisonous.

De Candolle, 1825, Pro. syst. nat., (2) 67. "Said to be the most poisonous species."

Rafinesque, 1830, Med. Flor. U.S., (2) 257. *R. pumilum* listed among the poisonous species.

Eaton, 1833, Man. Bot. N. Am., ed. 6, 303. *R. pumilum* classed as poisonous.

Gray, 1838, joint author; see Torrey.

Lindley, 1838, Flor. Med., 286. ". . . the most venomous of all."

Torrey and Gray, 1838, Flor. N. Am., (1) 217. "A very poisonous species."

Dietrich, 1840, Syn. plant., (2) 1002. "A most poisonous tree."

Eaton and Wright, 1840, N. Am. Bot., 392. Description of *R. pumila;* classed as poisonous.

Wright, 1840, joint author; see Eaton.

Loudon, 1844, Arb. Fruct. Brit., (2) 552.

Griffith, 1847, Med. Bot., 185. "Many other species of Rhus possess the same (poisonous) properties, in a greater or less degree, among which *R. venenatum* and *R. pumilum,* both natives of this country (America), are

exceedingly active, and have a powerful influence on persons unsusceptible to the action of the *R. toxicodendron.*"

Porcher, 1849, Trans. Am. Med. Assn., (2) 746. "According to Pursh, it is the most poisonous of the species."

Clapp, 1852, Trans. Am. Med. Assn., (5) 754. Quotes Pursh as to poisonous properties and states further, ". . . not known to be used in medicine, though it and the venenata are supposed to possess medical properties similar to those of the *R. toxicodendron.*"

Darby, 1857, Bot. South. States, (2) 254. Enumerates *R. pumila* among the venomous species. "Fruit clothed with a red silky pubescence. Said to be very poisonous."

Stearns, 1858, Am. Pharm. Assn. Proc., (7) 276. States (incorrectly) that *R. pumila* is found throughout Michigan. Gives "Poison Ash" as a synonym.

Porcher, 1863, Resour. South. Fields & For., 208. Records Pursh's assertion concerning the poisonous properties of *R. pumilum.*

Curtis, 1867, Geolog. & Nat. Hist. Surv. N. Car., (3) 15. Found in the lower and middle districts of North Carolina.

Paxton, 1868, Bot. Dict., 483. Enumerates the known species of Rhus, but makes no statement concerning the venomous properties of *R. pumila.*

Watson, 1878, Bib. Index N. Am. Bot., 183. Botanical references.

Burgess, 1880, Can. Jour. Med. Sci., (5) 329. ". . . said to be the most poisonous of the Eastern varieties."

Hale, 1883, Woods & Timb. N. Car., 151. Description of *R. pumila,* written by M. A. Curtis. See Curtis, this Bibliography.

Johnson, 1884, Man. Med. Bot. N. Am., 120. "*Rhus pumila* is said to be the most poisonous of the group. . . ."

Patterson, 1887, Check-List N. Am. Pl., 27.

Willis, 1889, joint author; see Wood.

Wood and Willis, 1889, Am. Bot. & Flor., 73. List *R. pumila.*

Millspaugh, 1892, Medic. Pl., (1) 36–2. "Our southern *R. pumila,* Michx., has been variously considered; some writers claiming it to be entirely innocuous, others judge it to be the most poisonous of the North American species, claiming that it will show its effects upon those who are not susceptible to the influence of *R. toxicodendron.*"

Sargent, 1895, *Gard. & For.,* (8) 404. Botanical review. Renames the species, calling it "*Rhus Michauxii.*" Refers to the reports of Boikin, LeConte, and Boynton, which are not given in this Bibliography.

Chapman, 1897, Flor. South. U. S., 72. *R. pumila* is listed as non-poisonous.

Gray and Robinson, 1897, Syn. Flor. N. Am., (1) 384. *R. pumila* listed.

Robinson, 1897, joint author; see Gray.

Draggendorff, 1898, Heilpfl. Völk. Zeit., 400. Many species of Rhus, including *R. pumila,* are mentioned.

Heller, 1900, Cat. N. Am. Pl., 129. *R. Michauxii* is listed.

Loundsberry, 1901, South. Wild Fl. & Trees, 306. "Famous among them all is *R. Michauxii* which for nearly or quite a hundred years was completely lost to the world of science. It is but a few years ago that it was

rediscovered." Excellent illustrations of a flowering and a fruiting branch are given.

Small, 1903, Flor. So. East. U. S., 729. *Schmaltzia Michauxii* (Sarg.) Small. ". . . rarely if at all poisonous."

Thwaites, 1904, Ear. West. Trav., (3) 101. *Rhus pumila* mentioned in a translated portion of Michaux's journal. Evidently collected near Waxsaw Creek, in South Carolina.

Warren, 1909, Pharm. Jour. (83) 531. It is noted that some of the species now classed as poisonous may later be proved to be harmless.

Trelease, 1910, Ann. Rep. Mo. Bot. Gard., (20) 11. An excellent illustration is given of *Rhus Michauxii* as growing in the Missouri Botanical Gardens. The illustration is reproduced as a frontispiece to this paper.

LABORATORY OF THE AMERICAN MEDICAL ASSOCIATION.

A NOTE ON THE SO-CALLED EMULSION OF SILVER IODIDE.*

BY JOHN K. THUM, PH.G.
Pharmacist at the German Hospital, Philadelphia.

When the writer first began to experiment with silver iodide with the object in view of obtaining a perfect suspension of this salt in a liquid, he used the yolk of fresh eggs with ideal results; the precipitation of the silver iodide, obtained by the reaction between potassium iodide and silver nitrate, being allowed to take place in the presence of the egg-yolk. By adhering to this method, the greater part of the resulting silver iodide was kept in colloidal solution.

This method of manufacture was discarded though because of the scarcity and expensiveness of eggs at that time, and which condition still obtains at present.

After some further experiment with mucilaginous substances of various kinds, the Mucilage of Irish Moss of the National Formulary was decided upon as being, next to the albumen, the most efficient and satisfactory.

Recently it occurred to the writer that the use of a typical colloid, such as gelatin, would be productive of better results and, accordingly, some experimentation with this substance was carried on.

Aqueous solutions of a good quality of gelatin were made, ranging in strength from 0.1 to 0.5 per cent.; the solution of the gelatin

---

* Nascent Silver Iodide. By M. I. Wilbert, Ph.M., AMERICAN JOURNAL OF PHARMACY, Feb., 1906.

being facilitated by slightly warming. A rather curious thing about the precipitation of the silver iodide, which was obtained by dissolving the potassium iodide in the gelatin solution, and gradually adding the silver nitrate in small quantities, shaking well after each addition, was, that the resulting precipitate fell immediately to the bottom of the flask after agitation of the flask was discontinued. Shaking at frequent intervals during the next twenty-four to thirty-six hours, however, brought nearly the whole quantity of silver iodide into almost perfect suspension. After the lapse of a week, without any shaking of the flask whatever, there was observed at the top of the flask a very slight margin of supernatant liquor.

As stated above this same method of procedure was carried out with 0.1, 0.2, 0.3, 0.4, and 0.5 per cent. aqueous solutions of gelatin. These various mixtures were allowed to stand, protected from light, at room temperature, for a period of at least five weeks, and comparisons made. I might here state that time seems to be an important factor in making these suspensions; from week to week one could notice that they were becoming more and more homogeneous. All of these suspensions of the silver iodide were very good, but to the writer it seemed that the one containing 0.3 per cent. of gelatin was almost perfect. In fact it had the appearance of cows' milk, rich in cream, with but a slight sediment at the bottom of the flask and which was readily suspended by a gentle shaking.

It was not possible to separate this colloidal suspension from the liquid by filtration, because it passed through the pores of the finest filter paper.

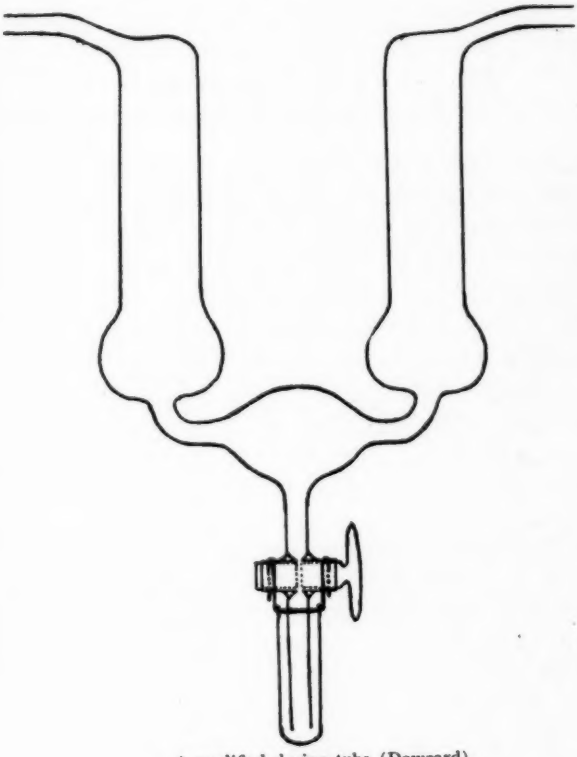
Examined under the microscope a drop of the freshly made preparation exhibits the usual appearance of powdered silver iodide. But after the preparation has been made some time a marked change is at once observed. The action of the gelatin, which must be a mechanical one, has reduced the silver iodide to a remarkable degree of pulverization.

A MODIFIED DRYING TUBE.

By Edwin Dowzard.

Some time ago the writer was engaged in an investigation which required the use of a train of Pelligot tubes, charged with H_2SO_4, for drying purposes.

As the H_2SO_4 had to be changed every few days, it was necessary to disconnect the tubes for recharging.



A modified drying tube (Dowzard).

This proved to be inconvenient, owing to the time required to disconnect and connect a rather complicated apparatus. To obviate this, a stopcock was fused to the lower part of the tube, see sketch.

By means of this stopcock, the H_2SO_4 may be removed and fresh acid drawn up into the tube by suction.

If it is desired, the tube may be partly filled with pieces of pumice before fusing on the side tubes.

A small test-tube is suspended under the stopcock by means of a copper wire, to catch any drops of H_2SO_4 which may fall.

This piece of apparatus has given great satisfaction, as it allows a change of H_2SO_4 without the necessity of disconnection.

ANALYTICAL DEPT., Parke, Davis & Co., Detroit, Mich.

EXPERIMENTAL PHARMACOLOGY: AN ESSENTIAL IN THE PHARMACEUTICAL CURRICULUM.*

BY RUFUS A. LYMAN,
Director of the School of Pharmacy, University of Nebraska.

I have been requested to express my views upon this subject. I make no claims to the title of a pharmacologist. I wish to be known as a physician interested in both medical and pharmaceutical education. I suppose because of the interest I have manifested along these lines, I was asked, a short time ago, to organize a school of pharmacy in the University of Nebraska, where it was felt by both educational and professional men that such an institution was needed in order that the young men and women of our State might receive a more efficient pharmaceutical training. My remarks are inspired by my experience as a student of medicine of ten years ago, and as a practitioner, and a teacher of medical and pharmaceutical students since that time.

In a former paper, I have quoted the following statement made by Professor J. T. Halsey of Tulane University: "A study of the current and past therapeutic literature will, I believe, convince any doubter who possesses sufficient knowledge to enable him to form an intelligent opinion, that there is no branch of medical science, other than therapeutics, wherein medical men display a more culpable and harmful ignorance of essential facts than is the case with pharmacology. Without an exact knowledge of the pharmacological action of some, at least, of our important drugs, a physician must become and remain an empiricist, one shooting in the dark with deadly weapons whose range and power are unknown to

* Read before the Section on Education and Legislation of the A. Ph. A., Richmond, Virginia, May, 1910.

him,"—a statement every phase of which every medical man knows to be brimming full of truth.

Many have attempted to explain the cause of the present chaotic condition of pharmacology and therapeutics. Medical men everywhere, and in some cases men prominent in the profession, have attributed it to the fact that the teaching of prescription writing has been neglected in our medical schools. In fact, in recent years more criticism from certain sources has fallen to the lot of this minor course than to the whole of the remainder of the medical curriculum. To a medical pedagogue such criticism is amusing. Even in these days of antipolypharmacy the teaching of the elements of prescription writing is necessary and practice in the same is desirable, but one cannot acquire a knowledge of the physiological action or therapeutic application of drugs through any amount of such teaching and practice.

To appreciate the present state of the medical and pharmaceutical sciences and the ignorance that prevails so largely within the profession, it is necessary to recall a few historical facts. As every one knows, historical medicine began with the Egyptians. We infer, however, that medical practice must have begun with the origin of the human race, coincident with the liability to injury and sickness. In the beginning the cause of disease was probably attributed to the indwelling of evil spirits. One may reasonably infer this from the fact that it was so believed later in historical times and the belief is still prevalent among savage tribes and semicivilized nations. Naturally the original method of treatment consisted of prayers and incantations. The making of noises and the application of fire were used to drive the demons from the afflicted. Material methods of treatment came to be used. By accident it was found that certain chemicals and plants seemed to be of value as means of cure. Curiously enough, the more disgusting and nauseating the substance the greater was believed to be its potency in the treatment of disease. A materia medica was developed of such a disgusting nature that civilized people must revolt against it. This came in the eighteenth century. The time was ripe for homœopathy. It came. The reaction set in. The pendulum swung to the other extreme and the early years of the nineteenth century witnessed a period of nihilism. The great Skoda (1805–1881) was its most ardent advocate. However, it was he who paved the way for the rational study of pharmacology and therapeutics. He introduced the methods of auscultation and

percussion, making it possible to study more accurately the effects of disease and consequently the action of remedies.

In 1817 morphine was isolated by Seitürner. Thus, a definite plant product was substituted for an indefinite crude drug. Animal experimentation was begun and gave rise to modern pharmacology.

In a recent article by Doctor Horatio Wood, Jr., entitled, "The Value and Limitations of Physiological Standardization," he points out the fact that experimental pharmacology is a new science, that the first experimental pharmacologist, in the modern acceptation of the term, is still living and teaching. He discusses the danger of error in the biological test and shows the necessity of its use in the standardization of certain pharmacopœial products and the testing of the efficiency of others. He calls attention especially to the work done upon digitalis and ergot by Americans and Europeans, of the new methods introduced by Doctor Reid Hunt in the study of glandular products, and to the fact that the problems which the pharmacologist is asked to solve at once make a herculean task, surrounded by numerous difficulties.

To one who has studied the subject ever so superficially it is evident the treatment of disease by drugs is to be made rational by introducing into our schools courses in experimental pharmacology. I believe the lack of such training is the greatest defect in our present system of medical education.

A student may be very well trained in the fundamental branches of medicine, such as anatomy, chemistry, physics, physiology, bacteriology, and pathology, he may be skilled in modern methods of physical and clinical diagnosis and still know nothing about the changes induced in the physiology of the normal animal body by the introduction of drugs and much less about their use in diseased conditions. For example, as a medical student I remember the importance that was placed upon strychnine as a therapeutic agent. I was taught that it was a tonic par excellence, that it increased all the functions of the body, that it increased the activity of the heart, that, in large doses, it induced convulsions, that it was useful in diseases of the heart, in certain digestive disturbances, in emaciated conditions, etc., etc. In a like manner I was taught the physiological action and therapeutic application of a hundred other substances. When I was through with it all, it seemed the most unsatisfactory subject in the medical curriculum. If, in the beginning, I had been given a frog and told to inject a certain quantity of strychnine into

the lymph sac and had been instructed to study the symptoms, and with the onset of convulsions had been shown how to do a series of simple operations which show conclusively that the convulsions are due to the action of strychnine upon the spinal cord, and not upon peripheral nerves, motor end plates, or muscles, and more than that, if I had been shown that this action upon the cord was due to its effect on certain elements in the cord and not upon others, I would have realized that strychnine was a body which produced marked and definite physiological changes. Having found that its presence (in some unknown manner) caused symptoms which indicated stimulation at a certain point, I would have been in a position to use strychnine rationally in any diseased condition where it might be desirable to increase the activity of the central nervous system and those functions which are controlled indirectly through it.

I would also have had a hint as to its possible uses in the treatment of depressing poisons and as a synergist to the action of other drugs. Strychnine would then have been a reality to me, a useful tool, something I could have used with satisfaction. That simple experiment would have opened a new field of thought. From various sources, we hear expressions of surprise that physicians prescribe proprietary remedies. There is no occasion for surprise. With the training they have received in our medical schools, and which they still receive in the majority of them, it is a surprise that pharmacopœial preparations are prescribed at all. If a school does not furnish a foundation upon which a superstructure may be built, graduates in medicine must still learn therapeutics from the label of the proprietary medicine bottle. This lack of pharmacological training is manifested on every hand among surgeons and medical practitioners of high standing. This leads to the most absurd mistakes. For example, a short time ago I was asked by one of the leading surgeons of Lincoln to step into his operating room and see one of his patients, " who was not doing very well on the table." I found a man undergoing an operation for a ruptured appendix. The abdomen was full of pus. The patient was in a condition of collapse before the beginning of the operation. The heart beat was just discernible. The attendants had just injected subcutaneously in the axilla 1 quart of physiological salt solution to which 6 drops of adrenalin chloride had been added. They were beginning with the second quart so treated. The surgeon remarked that the heart did not respond to the adrenalin. Of course it did not. The active

constituent was oxidized and rendered inert long before it reached the circulation. The patient died. Again, there is an obstetrician in our city who has no superior in the middle west. I lately discovered that he makes a routine of giving 5 drops of adrenalin chloride per os following labor, to cause uterine contraction and to prevent hemorrhage. Of course it is destroyed before it reaches the blood-vessels of the mucosa. I know of another man who gave cocaine by the mouth and was surprised that he did not get local anæsthesia in the skin. I saw another successful practitioner use strychnine hypodermically, in order to lessen the severity of an epileptic convulsion. Such examples might be quoted *ad infinitum*. Such errors would not occur had these men had pharmacologic training and been able to appreciate the pharmacologic point of view.

One physician, a graduate ten years ago from one of the famous eastern medical schools, now a man well known in our State, and a member of the faculty of the University, tells me whenever he has opportunity, that he does not believe students understand pharmacological experimental work. He is of the opinion that it is beyond them. He maintains that they go through the experiments as a matter of routine. This is not so. The average student is a thinking being, his thoughts only need directing. From his pharmacological experiments and observations he will draw conclusions as to the therapeutic uses which as a rule are surprisingly accurate.

My remarks have been made chiefly with the medical student in mind, but they are just as applicable to the training of the student of pharmacy. As pharmacological methods are elaborated and perfected, they will become more valuable in pharmacopœial standardization. I do not mean that we shall make expert experimental pharmacologists out of our pharmacists. That is not possible, but every pharmacist should understand the general principles of the biological test just as he does the general principles of the chemical tests of the Pharmacopœia. Likewise, experimental toxicology is an important subject to the practical pharmacist. In addition, the study of experimental pharmacology has an obvious educational advantage and must increase the standing of the pharmacist with physicians and with the people of the community in which he lives. Comparatively few medical schools, at the present time, offer courses in experimental pharmacology, and I believe there are no pharmacy schools with the exception of Nebraska. I may be mistaken in this matter and beg to be corrected if I am. My information has been

obtained from the catalogues of the leading American schools and my time has been too limited to write to representative institutions. Experimental pharmacologists are scarcely obtainable at any price because they do not exist. I suppose there are, in the United States, a dozen men who can be called expert pharmacologists, perhaps a few more or less, the number is immaterial. The question is then, how can we install experimental pharmacological teaching in our schools? While experimental pharmacologists are few, physiologists are more plentiful. I believe there are very few State institutions, even in the newer west, that do not have a trained, experimental physiologist. The first prerequisite of a pharmacologist is, of course, that he be a physiologist, and pharmacological work is the legitimate field of the physiologist. No apparatus is needed which is not found in a fairly well-equipped physiological laboratory. I can see no reason why, at least, the fundamentals of experimental pharmacology could not be taught to students of pharmacy. They should, at least, be shown that drugs do induce physiological changes, that these changes are induced by action upon certain part or parts of the organism, and that such action may be used as a means of classification and standardization. If such a movement could be made general, it would give a wonderful impetus to a science which is full of promise for improving both medical and pharmaceutical practice. To me, it is a most significant fact that Ehrlich should, in the prime of his life, turn away from the subject of immunity and serums, to devote practically all of his time to the study of pharmacological problems.

Pharmacy and medicine have a common aim, viz., the conservation of the public health. In recent years we have witnessed a marvelous campaign, waged by the two professions against quackery, graft, disease, and the use of narcotic and habit producing drugs, food preservatives, adulterants, etc. In this work, the leaders of the pharmaceutical profession have taken a place second to medical men. As time goes on, I believe both physician and pharmacist must assume more and more the rôle of the teacher, and co-operate with the teaching profession, and use that profession in disseminating the necessary knowledge to the public. An interesting experiment is being tried in Nebraska, with success. We have a State Teachers' Association of 4000 members. It is composed of twenty-one sections. Two years ago, few philanthropically inclined individuals requested that a section be added to the association,

which should have for its object the discussion of subjects which concern the public health, especially the health of school children. This was done. The section was called the Section on Medical Education. During three days' session of the teachers, many sections must be held at the same time, nevertheless, since its organization 600 teachers have been in attendance at each meeting. The problems are presented to the teachers by the foremost medical and pharmaceutical men of our State, in such a way that the teachers can use the material to advantage in the school-room. I speak of this matter because I believe it is one of the things to which we, as physicians and pharmacists, should give our serious attention. I will admit, however, that I have a certain feeling of pride in the novelty of the scheme.

I would feel justified in giving courses in experimental pharmacology to pharmacy students, if it were for no other reason than that they may see for themselves the harmful effects of the groups of drugs previously mentioned, in order that they may be in a position to authoritatively instruct the citizens of the respective communities in which they dwell.

I am not in sympathy with some recently expressed views that the education of the pharmacist should be broader in order that his field of operation in a professional way be extended, but I do believe in a broader, more thorough, and more scientific training, in order that his efficiency and usefulness may be increased in the field in which he now operates.

THE NETHERLANDS PHARMACOPŒIA.*

By Henry Kraemer.

On recommendation of the Secretary of the Interior, her Majesty, the Queen, decreed, on March 8, 1899, that a commission, consisting of ten members, be appointed to revise the Netherlands Pharmacopœia (Pharmacopœa Nederlandica).

The commission as first appointed was constituted as follows: five university professors, two of whom were professors in pharmacy, one a professor in botany, one a professor in chemistry, and one a

* Read before the Section on Practical Pharmacy of the American Pharmaceutical Association, May, 1910.

professor in pharmacology; four practical pharmacists, and a chairman, who was the chief of the Board of Health.

The personnel of the original commission was, however, somewhat changed through the death of two members and the resignation of two others, one of whom subsequently died.

Thus, the committee finally responsible for the work of revising the fourth edition of the Netherlands Pharmacopœia consisted of the following members: Dr. H. Wefers Bettink, director of the Pharmaceutical Institute, and professor of pharmacognosy, toxicology, and chemistry, University of Utrecht, chairman; H. P. Wijsman, professor of pharmacy, University of Leiden; J. Gu. Moll, professor of botany, University of Groningen; Gu. Nolen, professor of pharmacology, University of Leiden; Dr. H. Zeehuisen, Army surgeon; P. A. Vos, pharmacist in Rotterdam; C. Guldensteeden Egeling, apothecary in the Province of Zeist; M. J. Schröder, pharmacist of Groningen; L. van Itallie, pharmacist of Rotterdam, now professor in the Veterinary School of Utrecht; Dr. M. Greshoff, director of the Colonial Museum in Harlem.

Before beginning the work of revision proper, the commission asked the national society of medicine and the national society of pharmacy to make such recommendations as they deemed advisable, and they were given until January 15, 1900, in which to consider the matter and formulate their recommendations and suggestions. The commission also took measures to obtain the views of physicians and pharmacists in the Dutch Colonies of the East and West Indies in regard to the manner in which the Pharmacopœia could be improved so as to suit their needs.

After considering the question in all of its bearings they determined to make a pharmacopœia which could be used both in the Netherlands and in the Colonies, giving such alternate formulæ as were necessary to meet the conditions in the Colonies, one of these being the tropical climate. Thus, in the case of ointments requiring 20 to 30 per cent. of adeps or vaseline, provision is made for replacing these bases with cera flava or paraffin. In the case of the Indian drugs the local synonyms are appended at the end of the paragraph describing the drug, as, for example, in the case of curcuma, where the synonym, *temoe lawak,* is given.

The commission, after having completed the work of revision, embodied the proposed corrections, additions, and other changes in a supplement, which was published in 1902. Two or three years

were then allowed to elapse in order that the proposed changes might be thought over and their merits and applicability in practice determined. After this preliminary testing of the new Fourth Edition it was published in 1905 and became the official standard on July 1, 1906.

The new work was first printed in Hollandese (Dutch) and then translated into Latin. The Latin edition contains about 550 pages, and is printed in clear type. The book happily combines the results of careful experimental work and improved methods required in the practice of modern pharmacy, and may be said to be the most complete and scientific of any of the national pharmacopœias.

While it is manifestly impossible to consider *in extenso* the various interesting features of the new Netherlands Pharmacopœia in the brief time at my disposal, I shall point out some of the general principles which maintained in the revision of the work, and perhaps call attention to some of the individual drugs and classes of preparations.

One of the notable features of the Netherlands Pharmacopœia, and which makes it a model for an international pharmacopœia, which it is in a certain sense, is that due to the adherence of the commission to the standards adopted by the Brussels Conference for the Unification of the Formulæ for Potent Medicaments. While the agreement for adopting these standards was not signed until November 29, 1906, that is, five months after the Pharmacopœia became official, the standards were practically adopted as proposed by the Brussels Conference in 1902, and the initials "F.I." (Formula Internationalis) are given after the title of each preparation of the potent drugs, as "Tinctura Aconiti, F.I."

The descriptions of the official articles are uniformly complete, rather than what might be termed adequate, as is the case in most of the other pharmacopœias. In practice this is found to be of very great importance, as one is not able to say that a supposedly insignificant character is not of importance at times. If uniform standards mean anything, especially with such potent drugs as aconite and digitalis, for which settled standards have not been provided, it would seem reasonable that the descriptions of the vegetable drugs, as they are the most indefinite substances on the market, should not only be accurate, but fairly complete, so as to preclude the chance for misinterpretation. In the Netherlands Pharmacopœia these

descriptions are frequently as complete as those for the alkaloids and other chemical substances, and in some instances much longer.

The titles for articles and the nomenclature are similar to those in the Third Edition. The main titles of the articles correspond in general to those customarily used in European pharmacopœias, with the exception of the chemical salts, where the acid radical precedes the name of the base, as iodetum kalicum for potassium iodide, and benzoas natricus for sodium benzoate. While this is contrary to general custom, it may have some advantages, as the physician will find the iodides, benzoates, and so on, grouped together in their respective classes. The titles of vegetable drugs for the most part include a prefix, which indicates the part of the plant used, as cortex granati, which title corresponds to the granatum of the U. S. Pharmacopœia. Under the principal title a synonym is frequently given, as, for example, aqua calcis, the synonym for solutio hydratis calcici. Common-name synonyms as we know them in this country are not given, except in the case of the East Indian drugs, already mentioned. This also would seem to have an advantage in that greater uniformity in prescription writing would obtain.

Vegetable Drugs.—In the definitions of vegetable drugs it is noticeable that the names of families to which the plants belong are replaced by a citation of the literature giving the original description of the plant, as under radix ipecacuanhæ, where we read, "Radices adventiciæ tumefactæ quas præbet Psychotria Ipecacuanha, Stokes," Bot. Mat. Med., I, 365 (Uragoga Ipecacuanha, Baill. Hist., Pl. VII, 281).

The macroscopic descriptions are complete, and written in such a manner as to indicate that it is expected that dried drugs, such as leaves, will be softened before examination, and frequently the characters described are those requiring the use of a hand lens magnifying five diameters. The histological characters are also carefully described, including descriptions of both longitudinal and transverse sections of a number of drugs.

The powdered drugs are fully described, frequently at considerable length, beginning with the more important and prominent characters and extending to the less characteristic features. The descriptions are based on examinations made with the following reagents: water, chloral hydrate solution, and chloral-iodine solution, and in special cases other reagents may be employed. It is

furthermore directed that if the pharmacist has any question as to the authenticity of the sample examined, he shall compare it with the powder of a drug, the identity of which is known or has been established.

It should be emphasized that this is a very important rule to observe. Considerable stress is laid upon the size of the tissues and cell-contents, and the manner of stating the measurements is quite a novel one.

As every one knows there are certain discrepancies in the literature with regard to the length of fibres, size of starch grains, number of carpels, etc. In order to prepare accurate statements based on statistics which would allow for uncertain variations the latter were arranged in such a manner that the curve of probability would indicate the different possible errors. This is arrived at as follows: The number indicating the minimum size is subtracted from that of the maximum size, and the half of the remainder, known as the quarter (quartilis), is taken to represent the probable mathematical error. The average (or medium) size is obtained either by subtracting the quarter from the maximum or adding it to the minimum. The average size or the average number is indicated by M and the probable variation above or below this is indicated by Q, and thus we find under the description of the fibres of powdered cinnamon that M is equivalent to 489.5 μ and Q equals 55.7 μ, and thus one would expect to find a variation ranging from 433.8 to 545.2 μ.

In those cases where the curve of probability of error would become asymmetric, as in the measurement of potato or maranta starch grains, the size is indicated by an arithmetical ratio represented thus (x). Thus under amylum solani we find that the error of asymmetry in length of the grain is given as 23 μ, and is expressed as $x = 23\ \mu$. This means that after making the measurements of a large number of grains in a certain field, the sum of the sizes of the grains divided by the total number examined gives x, or the arithmetical ratio.

Again, in the study of starch grains, the position of the point of origin of growth or hilum is indicated by a fraction, the numerator and denominator indicating respectively the distance of the nucleus from the two ends or the two extremes of the longer diameter. Thus, $^1/_1$ would indicate that the nucleus is central as in wheat starch; $1/4$, as in the case of potato starch grains where the nucleus is $1/4$ the diameter from the narrow end. In the case of maranta

starch the position of the nucleus is given as $^1/_1$–⅓, meaning that the nucleus is either central or ⅓ the distance from the margin to the narrow end in longitudinal section.

In addition to the detailed descriptions of the macroscopic and microscopic characters of the drugs, assay methods are given for many of the potent drugs and statements giving the percentage of ash, amount of extractive, and also other special tests for identity or quality in certain cases.

Chemical Substances or Medicinal Chemicals.—In most cases the formula of the chemical is given under the title. A purity rubric is not given, the descriptions and tests being so exact as to establish a high purity of the substance, as is generally the case with foreign pharmacopœias. In the testing of chemicals for impurities, unless a special procedure is given, it is directed that three drops of the reagent shall be added to 5 c.c. of a solution of the chemical. Under olea pinguia are given a number of general tests for the testing of fixed oils and fats, together with exact methods of procedure in determining the iodine number, saponification figure, and acid equivalent. Under olea volatilia, similarly, a general procedure is given for determining the presence of alcohol or fatty oils. In some cases, as under oleum fœniculi, the optical rotation is given, and, again, as under oleum piperita, a method is given for determining the proximate constituent, menthol. In determining the melting point of fats and fatty substances capillary tubes are used in which the fat is taken up by capillarity after it is melted, and then allowed to stand for twenty-four hours, when the melting point is determined by using a glycerin bath. Specific gravities are determined at a temperature of 15° C. As would be expected O = 16 is taken as the basis for atomic weights, hydrogen being equivalent to 1.008.

Pharmaceutical.—The pharmaceutical portion of the book is characterized by the same originality and thoroughness as characterizes the parts already considered. In preparing vegetable drugs for grinding great care is exercised in the drying of the drug, none of the drugs ever being dried above 50° C., and those containing volatile principles not above 40° C., and in some cases over slaked lime. They are then reduced to the fineness required and kept in ground glass-stoppered bottles. Two kinds of sieves are used, one for coarse powders and one for fine powders. In the sieves for coarse powders the meshes are round and are respectively in diameter 1½, 3, and 5 mm. These are designated as $A_{1\frac{1}{2}}$, A_3,

and A_5. For fine powders a sieve of silk is used, the meshes being square, there being 10, 20, 30, 40 or 50 meshes in 1 cm. These meshes are indicated as follows: B_{10}, B_{20}, B_{30}, B_{40}, and B_{50}. If in connection with an article no fineness is given for the powder, it is intended that the pharmacist shall use a powder of the general degree of fineness designated for certain drugs. Again, there are quite a number of powders which are directed to be kept protected from light and these are indicated by an asterisk (*). The physical factors which influence the quality or stability of drugs, as light, temperature, moisture, have been given careful consideration. It is directed that all drugs and preparations not in daily use shall be stored in dark rooms and in this connection we note that certain vegetable drugs, as digitalis, are to be kept in tightly closed tin drums in which are placed wide-mouthed bottles containing burnt lime and covered with leather or parchment provided with a suitable number of perforations. It is also directed that hygroscopic chemicals shall be kept in containers with burnt lime. Volatile substances are to be kept in tightly closed glass-stoppered bottles. Chemicals which are affected by the light are required to be kept in black, red, or yellowish-brown bottles. Extracts and ointments are to be kept in jars which do not permit the entrance of light. The commonly used terms relating to temperature in pharmaceutical processes and manipulations all have a definite meaning; thus, when applied to water, *luke-warm* means a temperature of 20°–40° C.; *warm,* a temperature of 60°–70° C.; *hot,* a temperature of 85°–95° C. Again, the temperatures for the processes of maceration, digestion, and infusion are respectively, 15°–25° C., 35°–40° C., and 90°–98° C.

Standard measures have likewise been adopted. A teaspoonful is defined as equivalent to 3 c.c.; a dessertspoonful as 8 c.c.; and a tablespoonful as 15 c.c., and physicians are requested to adopt the rule of using cubic centimetres when ordering liquid medicines. The standard dropper, approved by the Brussels Conference, has been made official, the dropper having a bore of 3 mm. at the exit end and dropping 20 drops of distilled water at 15° C., which should weigh 1 Gm. A table has been included giving the number of drops in a gramme of various liquid preparations and solutions.

In the weighing of drug materials three different grades of scales are directed to be used, which are designated as A, B, B_2. Scale A is used in weighing amounts of substances not exceeding

50 Gm., or 10 Gm. with a finer scale. With this scale, which is known as a milligramme scale, the maximum declination or vibration should not be greater than 2 mm. in 1 dm., and not continue longer than one second, when using a weight of 5 mg. Scale B is known as a gramme scale and is used in weighing amounts not greater than 250 Gm., or 100 Gm. with a finer scale. With this scale the sensitiveness should be the same as in Scale A, when using 50 mg. weight. Scale B_2 is used for weighing amounts of substances not exceeding 1 kg., or 250 Gm. with a scale less sensitive than Class B. With this scale the sensitiveness should be the same as in Scale A, when using a 250 mg. weight.

Of the articles official in the Third Edition, 55 were deleted, and 195 new articles were added, making a total number in the Fourth Edition of 652. Of these about 210 are required to be kept in stock at all times by the apothecary. The remaining 442 articles are indicated by a plus (+) sign. In accordance with the Brussels Conference, as already pointed out, the strength of tinctures of potent drugs is 10 per cent.; acidum hydrocyanicum dilutum, 2 per cent.; aqua laurocerasi, $^1/_{10}$ of 1 per cent., or 1 part in 1000, of hydrocyanic acid; the different narcotic extracts and fluidextracts and liquor kalii arsenicosi, 1 per cent.; pulvis ipecacuanhæ opiatus, 10 per cent. of each of the potent drugs; sirupus ferri iodati, 5 per cent.; vinum stibiatum, $^4/_{10}$ of 1 per cent. or 4 per 1000. In order that physicians, as well as apothecaries, shall have in mind the changes in strength of the preparations of potent drugs the abbreviation F.I. (Formula Internationalis) is placed after the title.

In a table (Table A) a list of 42 poisons is given which should be kept in a closet to themselves. In another table a list of poisons is given which may be kept out convenient for use if marked with a label bearing a distinct blue cross. Another table includes medicines which physicians are required to keep on hand. Thus, with the number of drugs and preparations which the pharmacist must always have on hand, and those which physicians are required to keep at hand, the interests of the public are looked after in a manner which seems to be very commendable.

Doses.—In order to satisfy the expressed wish of most of the apothecaries of Holland who desired to have a guide that they might follow, the single maximum dose and the maximum dose in twenty-four hours for an adult are given, these being given also in the index, which is, in fact, an alphabetical table giving, in addition, informa-

tion regarding solubility in water and alcohol, and indicating the drugs which are to be kept away from light and those which are to be kept in hermetically sealed containers. If a physician desires to use a larger dose, he is expected to indicate the fact by placing an exclamation point (!) after the name of the medicine specified. These doses hold not only for substances when intended for internal administration but also when administered hypodermically, used in suppositories, or applied to the skin.

First Help Table.—In order that the pharmacist may be prepared to act in cases of sudden poisoning there is given in the Appendix an outline of procedure and a list of suitable antidotes which may be easily dispensed by him, he being required to summon a physician as soon as practicable.

The Appendix comprises some eight or nine tables, including (1) general reagents; (2) volumetric solutions; (3) a table of solutions of the alkalies and mineral acids, giving the specific gravity, amount of the chemical in 1000 c.c., and the titration equivalent for each cubic centimetre; (4) a table giving the specific gravity of certain substances at temperatures between 12° and 35° C., as alcohol, ether, chloroform, mineral acids, etc.; (5) a table giving the number of standard drops in a gramme of various potent drugs; (6) an alcohol table; (7) a saturation table; (8) a neutralization table, showing the amount of alkali necessary to neutralize acids or of acids to neutralize alkalies; (9) a table of atomic weights of the common elements.

While it would be desirable for some reasons to compare formula with formula and description with description of the Netherlands and our own Pharmacopœia, this is manifestly impracticable, even with many of the important ones, in a paper of this kind. I will, however, consider a few of the minor or detailed features.

Not only has the Netherlands Pharmacopœia adopted the standards of the Brussels Conference for tinctures of potent drugs but also for certain alkaloids, as the hydrochlorate of cocaine, the title of which is hydrochloras cocaini, F.I., which means that it shall answer the original MacLagan's test for other coca alkaloids, and in addition to other tests there is a method given for the detection of cinnamyl ecgonine.

Under the various galenicals, as tinctures, various data are given for their identification and test of purity, as color, specific gravity, amount of extract, and certain specific tests. In the preparation of tinctures, unless a special method is given, either percolation or

maceration may be used. When maceration is followed, the comminuted drug is mixed with the proper quantity of the menstruum, allowed to macerate five days with occasional agitation, and protected from light. The marc is pressed out and the liquid portion allowed to stand in a cool place for two days, when it is filtered, care being taken to prevent evaporation. In following out the percolation method the menstruum is divided into three parts, two of which are intimately mixed with the drug, allowed to macerate for twelve hours. This macerated mixture is then added to a percolator and slightly compressed. Sufficient menstruum is added until the percolate begins to flow from the orifice of the percolator, the latter is then closed and the drug allowed to macerate for 24 hours. The stopper is removed and percolation allowed to proceed, and as much menstruum added as is necessary to make the required amount after expression of the marc. The tincture is allowed to stand for two days in a cool place, when it is filtered, taking care to avoid loss by evaporation.

All of the tinctures of potent drugs are made by percolation, while all of the remaining tinctures are made by maceration. In the case of tinctura secalis cornuti and tinctura strychni, the fixed oil is first removed from the drugs by means of petroleum ether. There is also a general test given for the detection of wood alcohol and acetone in tinctures.

Three classes of extracts of vegetable drugs are recognized: dry extracts or siccum (extracta sicca), which contain not more than 6 per cent. of moisture; solid extracts, or extracta spissa, which contain not more than 20 per cent. of water, and liquid extracts. The extracts of potent drugs are made by percolation in much the same manner as given for tinctures, the alcohol being removed either by distillation at a temperature not higher than 90° C., or it may be allowed to evaporate spontaneously until the extract has the desired consistency. Most of the extracts of the other drugs are made by maceration or infusion, it being understood that the processes are carried out at definite temperatures, considerable care being directed in the evaporation of the extracts. In extractum secale cornuti, chloroform is used as a menstruum; in a number of extracts a certain amount of glycerin is directed, as with cinchona. With the latter drug dilute hydrochloric acid forms a part of the menstruum. In preparation of the liquid extract of hydrastis tartaric acid is added to the menstruum. Methods are given for the determination of moisture, the examination of the ash for metallic

substances, and they are required to be protected from light, and in view of their containing soluble constituents, to be kept in glass-stoppered bottles.

It is rather surprising that in view of the increasing use of so-called animal drugs in this country, as antitoxins, etc.; none of these articles are official in the Netherlands Pharmacopœia. This is probably accounted for by the fact that one of the principles of revision is not to include any substance, no matter how widely used it may be, which the pharmacist does not prepare or has no adequate means of testing. Neither are patented or trade-marked preparations official, the entire responsibility for their quality resting with the manufacturer. On the other hand, formulæ are given for the preparation of teas (species); artificial aperient salts, as Carlsbad salts; medicated cottons and gauzes; granules, and so on. Indeed there are methods for every class of pharmaceutical preparations from aquæ to vinæ, and with standards or tests for every substance and preparation used.

Everything that science or experience can offer is at the disposal of the physician, and the pharmacist cannot misunderstand the specifications of the physician or fail to supply uniform and efficient preparations.

I may in conclusion say that the Netherlands Pharmacopœia is not only a very valuable practical guide for the retail pharmacist, but that it furnishes high standards for the official drugs, the revisers having availed themselves of the scientific progress touching their work and having also manifested a broadly democratic spirit. We have also in the Netherlands Pharmacopœia a standard, which while revised by authority of the Government, yet strictly speaking none of the members of the commission are Government officials. The commission is a small one, and the members are directly responsible for the work.

The Japanese have used it as a model since 1880, and it would be well if an English translation were available for consultation and study in this country.

Finally, I acknowledge my indebtedness to Mr. Peter Amsterdam for assistance in translating and critically examining certain portions of the Latin edition. I have also had access to two excellent reviews of this work, one by Schoepp in the *Apotheker Zeitung* for 1906 and 1907, and another by Weigel in the *Pharmaceutische Zentralhalle* for 1906.

SHALL WE HAVE A PROFESSION OF PHARMACY?

By F. E. Stewart, Ph.G., M.D.

The following is abstracted from my lecture on the above subject delivered recently before the Philadelphia College of Pharmacy and the Medico-Chirurgical College of Philadelphia. This abstract represents the lecture very incompletely; and, as the subject is fundamental and vital to the existence of pharmacy as a profession, the entire lecture, which will be published later,[1] should be read.

Pharmacy, or the art of preparing medicine, is historically and in fact a branch of medical science and practice. Like theology, law, and medicine, pharmacy was originally practised by the priests. Advance in civilization finally segregated the vocation of the priest; and theology, law, and medicine became separate professions. The segregation was accomplished gradually. The priests practised medicine, surgery, and pharmacy. In England this was the case.

In 1215, the priests in England were forbidden to practise any surgery which involved the shedding of blood. About a century later all forms of surgery were forbidden them, and thus began the division between medicine and surgery which still continues.

The physician was still the pharmacist, until chemistry was born of alchemy, and its application to the study of materia medica rendering pharmacy more complex, it was finally relegated to the apothecaries, who in those days were members of the Guild of Grocers, the vocation not being of a professional character. In 1607, under the title of the "Apothecaries of the City of London," the apothecaries separated from the grocers, and appear to have prescribed medicines in addition to dispensing them, claiming an ancient right of acting in this double capacity, although theoretically the apothecary was the humble servant of the physician, merely preparing the medicines ordered by the latter.

When the priests or monks ceased to practise surgery, the barbers, who had acted as their assistants, usually ignorant and venal in the extreme, practised alongside of the surgeons proper. In the sixteenth century, medicine being still largely a priestly vocation, Linacre, a celebrated divine, physician to Henry the Eighth, founded,

[1] Published in *Pharmaceutical Era*, May, 1910.

in England, the present College of Physicians, which, together with the Universities of Oxford and Cambridge, where medical schools had been established, received authority over all three branches of medicine.

It is worthy of note that whereas physicians qualified for their degrees by study at the universities, surgeons and apothecaries obtained their qualifications by apprenticeship (seven years apprenticeship being required for membership in the Apothecaries' Society), and apothecaries and surgeons were, therefore, ranked socially with tradesmen or members of other crafts, while physicians held the higher rank of membership in the learned professions.

In 1666, the Great Plague broke out in England, and although many physicians stood nobly at their posts, many more fled in terror. The sick, therefore, fell back upon the apothecaries, who distinguished themselves by their courage and humanity, and from this time on there seems to have been an increased tendency upon the part of the apothecary to assume the prerogatives of the physician.

A warm contest arose between physicians and apothecaries, the former accusing the latter of usurping their province, and the latter continuing and justifying the usurpation, until the dispute was finally set at rest, in 1703, by a judgment of the House of Lords. It was decided that the duty of the apothecary was not only to compound and dispense but also to direct and order the remedies used in the treatment of disease. He was allowed no right to charge for his services, but was to rely entirely on his medicines for his profits. In 1815 was passed an Act clearly contemplating "the creation of a class of practitioners who, while having the right to practise medicine, should assist and co-operate with the physicians and surgeons." The Act of 1874 "gave power to the Apothecaries' Society to unite or co-operate with the medical examining boards in granting licenses to practise." According to the Encyclopædia Britannica, from which I drew some of my information regarding the status of pharmacy in England, the term "apothecary" indicates a general practitioner who supplies drugs to his patients.

The "status of the apothecary in America" is still in the formative state, the process of formation being in rapid evolution. To understand the significance of the epoch-making events which have transpired in this country during the past decade, together with their probable effect upon the pharmacy of the future, it is necessary to consider more in detail the:

TRUE IDEAL OF PROFESSIONAL PHARMACY.

The term "profession of pharmacy" implies a fraternity of pharmacists holding as common property the results of the experience of the profession. According to the professional ideal, each pharmacist should manufacture and deal in the same pharmaceutical preparations, under the same names, made according to common standards and by the same methods; and each member of the profession is supposed to devote a portion of his time to original research and to publish the results of his observations for the benefit of science, that the fraternity may have free use of the same.

I called attention to the fact that the results of such researches, when reduced to law and embodied in system, constitute the "science of pharmacy," or, more properly, the "science of pharmacology." Pharmacology is defined by the National Syllabus Committee to be "The sum of scientific knowledge concerning drugs and medicines; their nature, preparation, administration, and effect; including pharmacognosy, pharmacy, pharmacodynamics, and therapydynamics." According to this same authority, "Pharmacy is a branch of pharmacology, including the science and art of preparing and dispensing medicine." These definitions are not new ones, being supported by H. C. Wood, in his text-book on Materia Medica, also by Hermann, in his "Experimental Pharmacology," and by the various dictionaries, but I will not take space here to give the full quotations I gave in my lectures.

According to the National Syllabus Committee's definitions, pharmacology embraces a knowledge of the following subjects: Drugs, medicines, materia medica, chemistry, pharmacy, physiology, botany, microscopy, pharmacognosy, toxicology, posology, elementary physics, manufacturing chemistry, pharmaceutical arithmetic, pharmaceutical latin, theory of pharmacy, practice of pharmacy, commercial pharmacy, manufacturing pharmacy, histological pharmacognosy, pharmacodynamics, therapydynamics, assaying, dispensing pharmacy, and pharmaceutical jurisprudence.

According to the Standard Dictionary, "Science is knowledge reduced to law and embodied in system." Therefore, the knowledge of the above-mentioned subjects, when systematically arranged, constitutes the "science of pharmacology." The same authority states "Knowledge of a single fact, not known or related to any other, or of many facts not known as having any mutual relations or com-

prehended under any general law, does not reach the meaning of science." Pharmacy, as previously defined, is, therefore, not sufficiently comprehensive to justify dignifying it as a science.

The logical conclusion is that the terms "Profession of Pharmacology" and "College of Pharmacology" are to be preferred to the less comprehensive terms now used.

HOW THE PROFESSIONAL IDEAL IS TO BE REALIZED.

Progress in pharmacologic science and practice is dependent upon four essential features; namely, organization, co-operation, standardization, and legislation.

Organization.—It is evident that the true professional ideal includes the organization into one association or fraternity of all persons devoted to the science of pharmacology or engaged in the practice of the pharmacologic arts. Such an association would include pharmacists engaged in retail, wholesale, and manufacturing drug business, the pharmaceutical chemists connected with the laboratories of manufacturing houses, and the teachers in medical and pharmaceutical schools working in the field of pharmacology. And, as pharmacotherapy is dependent upon pharmacology, physicians interested in that branch should also be included.

The American Pharmaceutical Association approaches more nearly to being such an organization than any other now existing, and could be made to cover the field by broadening its work to include pharmacodynamics and therapydynamics, and later to include pharmacotherapy also. The work of the National Syllabus Committee has become part of the work of the Section on Education and Legislation of the American Pharmaceutical Association, and I would suggest that the report of the committee (pages 750–58 of the Proceedings of the A. Ph. A. for 1908) is worth most serious consideration by all teachers and students of pharmacy.

Co-operation.—Progress in pharmacologic science and practice requires co-operation between practitioners of the pharmacologic arts and the medical profession. Unless the medical profession employs, in treating the sick, the medicines properly prepared by professional pharmacologists, of what use is a profession of pharmacology? The pharmacologist is not educated to diagnose and treat disease, and when he ignorantly prescribes medicines for self-medication he is a menace to public health and should be suppressed. Either the pharmacologist to be evolved by the operation of the

educational system proposed by the National Syllabus Committee will have to know enough of medicine to warrant his intelligently prescribing and recommending medicines, or the medical profession will have to be educated to appreciate a true profession of pharmacology. Both suggestions appeal to me as worthy of consideration.

Standardization.—The professional ideal includes a pharmacopœia, dispensatories, text-books, and colleges of pharmacy or pharmacology. Until the Pure Food and Drugs Act of June 30, 1906, went into effect, conformity with the standards of the U. S. Pharmacopœia was purely voluntary. This was an excuse for each manufacturer, little or big, to set up a standard of his own, and the ill effects resulting therefrom have given rise to the condition of mind on the part of physicians known as therapeutic nihilism. The enforcement of the federal Act mentioned, aided by State legislation of the same sort, will do much toward overcoming the ill effects of lack of standardization. The final end of any product worthy of consideration as a therapeutic agent should be its incorporation into the U.S.P. or N.F.

Legislation.—One of the most important suggestions regarding pharmacal and medical legislation ever made in this country is to be found in the decision of the Supreme Court of the United States, in the case of Worden vs. the California Fig Syrup Co., No. 35, October Term, 1902, as follows:

"Many, if not all, of the States of this Union have enactments forbidding and making penal the practice of medicine by persons who have not gone through a course of appropriate study and obtained a license from a board of examiners; and there is similar legislation in respect to pharmacists, and it would seem to be inconsistent and to defeat such salutary laws, if medical preparations, often and usually containing powerful and poisonous drugs, are permitted to be widely advertised and sold to all who are willing to purchase. Laws might properly be passed limiting and controlling such traffic by restraining retail dealers from selling such medicinal preparations, except when prescribed by regular medical practitioners."

The foregoing decision would force retail druggists to practise therapeutics or entirely discontinue the recommending of medicines, and as it would be practically impossible to carry on the retail drug business without the privilege of recommending medicines to persons coming to the drug store for the treatment of minor complaints,

it would, therefore, be the part of wisdom to arrange that such treatment should be given intelligently and in accordance with proper legal restrictions, not as a commercial business, but as a branch of medical practice under control of medical laws.

FUNCTION OF THE PHARMACOLOGIC PROFESSION.

The function of the pharmacologic profession shall be:

1. To promote progress in the science of pharmacology and the practice of the useful arts of pharmacognosy, pharmacy, pharmacodynamics, and therapydynamics.
   a. By investigating the substances from all parts of the world, which are, or may be, used as medicines, and introducing them to science and commerce.
   b. By devising methods for their identification, selection, preparation, preservation, compounding, and dispensing.
   c. By adopting and maintaining standards for their protection against adulteration, sophistication, and fraudulent substitution.
   d. By legislation for the protection of standards (pure food and drug laws); for the protection of the profession from encroachments from without upon its field (pharmacy laws); for the protection of the profession from malpractice on the part of its members (code of ethics); to protect materia medica science and commerce (copyright, patent, and trade-mark laws).
2. To co-operate with the medical profession in the prevention of disease and the treatment of the sick.
   a. By refraining from encroachment upon the field of medical practice.
   b. By refraining from advertising medicines for self-medication.
   c. By taking an active part in educating the public against the abuse of drugs.
   d. By acting as a medium for the dissemination of information in relation to the prevention of communicable disease, such as tuberculosis, smallpox, etc.
3. To practise the pharmacologic arts by selecting, preparing, preserving, compounding, and dispensing medicines, in accordance with professional and scientific requirements.

PERSONNEL OF THE PHARMACOLOGIC PROFESSION.

The pharmacologic profession shall consist of licensed physicians especially interested in materia medica, either as practitioners, teachers, or laboratory workers; graduates of pharmacy engaged in the retail or wholesale drug business or in the manufacturing chemical or pharmaceutical industries; pharmaceutical chemists with degrees from reputable schools or universities; botanists specially interested in pharmacognosy, and members of botanical societies in good standing; physiologists engaged in pharmacodynamic investigation and materia medica standardization; bacteriologists connected with laboratories for the production of biological materia medica products, or their investigation and standardization; and government experts in any way associated with departments engaged in the identification, or standardization, of drugs, or the study of medicinal plants and their agriculture.

CO-OPERATE INVESTIGATION OF THE MATERIA MEDICA AND INTRODUCTION OF NEW PRODUCTS.

Progress in pharmacologic science can be attained only through co-operative materia medica investigation, the results of which, according to professional ideals, belong not to the individual investigators but to the profession. Members of the pharmacologic profession, with the exception of teachers and government experts, should be supported by materia medica commerce, hence it is essential that such commerce shall be a professional vocation, that pharmacologists supported by commerce shall be considered scientists and entitled to rank with the members of the medical profession.

PURE FOOD AND DRUG LAWS.

The Pure Food and Drugs Act protects materia medica standards not only directly, but indirectly, by forcing manufacturers to label their products truthfully. Although, with few exceptions, drugs are not specifics, both retail and wholesale manufacturers of medicines have long advertised their products as "cures," and it is by means of these false claims that the so-called proprietary medicine business has reaped such a rich harvest. By ruling against the use of the word "cure" on labels the Government has dealt a solar plexus blow to such fraudulent exploitation of the public. Moreover, the

public is growing wiser, and no longer believes the advertisements of the nostrum manufacturers.

Recognizing the limitations of drugs as therapeutic agents, many persons are seeking in Christian Science, Osteopathy, the Emanuel Movement, Psychotherapy, etc., the relief not afforded by doctors and druggists, with results disastrous to the drug business and the medical profession. For this condition two remedies are suggested, one being that druggists should have the same faith in their drugs that Christian Scientists have in the doctrines of Mrs. Eddy and should inspire the public with such faith, giving their patrons the benefit of suggestive therapeutics; in other words, druggists are to become quack doctors and resort to pretense as a therapeutic agent.

The other remedy is the plan I have been advocating; namely, that pharmacists study medicine and obtain a license to practise therapeutics, taking advantage of their close contact with the people to educate them on the subject of medicine, that they may learn to avoid the numerous pitfalls for the unwary set by quacks and pretenders of all kinds. Aided by the enforcement of pure food and drug laws, this plan would doubtless prove of the greatest value to mankind and do more than anything else yet suggested to raise pharmacologic practice to its proper position as a learned and beneficent profession. What we need, and what the public is going to have sooner or later, is an honest pharmacologic service, and if physicians and pharmacists will co-operate in this endeavor the confidence of the public in medicine and pharmacy will be restored.

ENCROACHMENT OF THE MANUFACTURING HOUSE.

Many retail druggists object to the pure food and drug laws. They claim that the manufacture of medicine is the exclusive right of the retail druggists, and that the enforcement by the courts of standards for materia medica products is taking from the retailers their business as manufacturers and placing it in the hands of the great commercial houses, which are conducted by a non-professional body of men who do not hesitate to sacrifice the public for gain.

(*To be continued.*)

HYGIENIC LABORATORY BULLETINS.

In addition to Hygienic Laboratory Bulletin No. 63, commented on in this JOURNAL for October, 1910 (p. 495), at least four of the recently issued bulletins contain information that will be of interest and value to pharmacists.

It should be remembered that all applications for these publications should be addressed to the "Surgeon-General, U. S. Public Health and Marine-Hospital Service, Washington, D. C."

HYGIENIC LABORATORY BULLETIN No. 69. The effects of a Restricted Diet and of Various Diets upon the Resistance of Animals to Certain Poisons. By Reid Hunt. Washington, Government Printing Office, 1910, p. 89.

This bulletin contains reports of experiments and observations on a subject that promises to be of very great importance in the study of the action of medicines. In the course of his experimenting Hunt has observed some very striking alterations in the resistance of animals to certain poisons produced entirely by changes in diet. Thus of animals kept upon diets such as are in daily use by man some were able to resist many (up to 40) times the amount of certain poisons fatal to animals kept upon other diets. He points out that although the results with certain of these poisons probably have no relation to man, yet they show that man is doubtless daily producing profound effects upon his resisting power to poisons and diseases, a knowledge of some of which may be of much practical importance. It seems certain that by the use of some of these reactions changes in metabolism, which are not recognized by the methods ordinarily employed, may be detected.

As noted above, the experimental data recorded in this bulletin will no doubt be of value in stimulating investigation on the relation of diet to the physiologic and therapeutic action of remedial substances as well as the more direct toxic action of potent medicaments.

HYGIENIC LABORATORY BULLETIN No. 67. The Solubilities of the Pharmacopœial Organic Acids and Their Salts. By Atherton Seidell. Washington, Government Printing Office, 1910, p. 93.

This bulletin contains records of experimental work done to determine the solubility in water and aqueous alcohol solutions of some 40 or more official substances.

The experimental methods employed are described in detail and the results are given in the tables in all cases in the terms in which solubility data are usually expressed in the chemical literature, and in addition the equivalent values are expressed as customarily found in the pharmaceutical literature, *viz.*, the amount of solvent required to dissolve a unit amount of the dissolved substance. Seidell points out that although this latter mode of expressing solubility results has been used for many years by pharmacists, it is unscientific and not even as useful for practical purposes as the percentage basis adopted by chemists. As an illustration, pharmacists are usually called upon to compound their mixtures in certain definite amounts, and, therefore, the quantity of the dissolved substance which will be contained by the given volume of the solution is certainly of more practical interest to them than the knowledge of the amount of the solvent required for one part of the given substance. It would therefore appear of considerable advantage to pharmacists to abandon their antiquated mode of expressing solubility results and adopt the more rational percentage or unit of solvent basis in their pharmacopœias and pharmaceutical reference books.

HYGIENIC LABORATORY BULLETIN No. 66. I. The Influence of Age and Temperature on the Potency of Diphtheria Antitoxin. By John F. Anderson. II. An Organism (*Pseudomonas protea*) Isolated from Water, Agglutinated by the Serum of Typhoid Fever Patients. By W. H. Frost. III. Some Considerations on Colorimetry, and a New Colorimeter. By Norman Roberts. IV. A Gas Generator, in Four Forms, for Laboratory and Technical Use. By Norman Roberts. p. 104.

The contents of this bulletin are fully indicated by the titles of the several contributions enumerated above.

The paper by John F. Anderson is a comprehensive and timely review of work done on the keeping qualities of diphtheria antitoxin and a report of experiments made in the Hygienic Laboratory with 18 different lots of serum furnished by 14 different manufacturers. Anderson concludes that: "The average yearly loss in potency of diphtheria antitoxin at room temperature is about 20 per cent.; at 15° C., about 10 per cent.; at 5° C., about 6 per cent., although in some instances these percentages may be much increased.

"From this work, there appears to be but little difference in the

keeping qualities of untreated sera and sera concentrated by the Gibson process.

"Diphtheria antitoxin to be placed upon the market and there kept under unknown conditions as regards temperature should not be labeled with a return date longer than two years and should contain an excess of at least 33 per cent. to allow for decrease in potency; in addition, when the serum is sold in syringes with an absorbable piston, an excess should be added for this loss.

"Dried diphtheria antitoxin, kept in the dark, at 5° C., retains its potency practically unimpaired for at least five and one-half years.

"The lack of confidence in the therapeutic properties of old sera is without basis, as such sera, unit for unit, are as potent as new sera.

"The protective value of diphtheria antitoxin is in exact accord with its unit value and is independent of the volume of the serum or other properties in the serum."

The two contributions by Norman Roberts are also of interest to pharmacists engaged in laboratory work. The colorimeter described should prove to be useful and more economical in construction than any of the instruments of this kind now available.

The gas generator in the several forms described would appear to meet the requirements for which they were designed and are suggestive of simple modifications that could be adapted to the everyday needs of any laboratory.

HYGIENIC LABORATORY BULLETIN No. 65. Facts and Problems of Rabies. By A. M. Stimson. Washington, Government Printing Office, 1910, p. 85, pl. V.

This bulletin, while by no means pharmaceutical in nature, is, nevertheless, of interest to pharmacists because of the complete way in which a much dreaded disease is described and methods for its prevention or complete eradication outlined.

After comprehensively reviewing the history, prevalence, pathology, and etiology of rabies, Stimson discusses its prevention and treatment and concludes, in part, that: "It is apparent that the disease is quite prevalent in the lower animals and not as rare in man as has been supposed. Exact information as to its prevalence in the United States is not available and its acquisition is necessary.

We have a good deal of data on the pathological findings of the disease, but there are many points concerning its essential pathology that require elucidation. We know that rabies is caused by a living micro-organism which invades the nervous system and can be thrown off in the saliva. The exact nature of this organism is still unknown.

"The treatment of developed rabies by means of drugs, while it has received considerable attention in the past, perhaps because of the discouraging outcome of the earlier attempts at treatment, has received but little attention in recent years. In view of the facts that the balance of evidence leans toward the protozoan nature of rabies, and that certain protozoan infections are amenable to cure by specific drugs, it is our opinion that research in this direction should not be abandoned. The most promising line of investigation in this connection would appear to be based not upon the physiological action of the drug, but upon its action upon the parasite. Here we are limited at once by our lack of knowledge.

"Attempts to improve upon the methods of immunization of exposed persons are desirable, in order to eliminate the small percentage of failures and the very much smaller proportion of injurious results. In making such attempts, however, we must not jeopardize human life by the use of methods which are without experimental basis.

"Finally, as regards the eradication of rabies, we have now and have had for a long time all the knowledge of rabies necessary to effect its entire suppression. This knowledge can be summed up in a single sentence, to wit: Rabies is perpetuated in the dog through the infliction of bites by a rabid dog and does not arise spontaneously. If all rabid dogs could be prevented from biting other animals, rabies would in the course of a year be a mere historical curiosity of medicine, an illegitimate field of research for the investigator in pure pathology, a plaything for the controversialist."

BOOK REVIEWS.

ARBEITEN AUS DEM PHARMAZEUTISCHEN INSTITUT DER UNIVERSITÄT BERLIN. Herausgegeben von Dr. H. Thoms, Professor und Direktor des Pharmazeutischen Institutes der Universität Berlin. Siebenter Band. Umfassend die Arbeiten des Jahres, 1909. Mit 6 Textabbildungen und 7 Tafeln. Berlin, Urban & Schwarzenberg, 1910. Paper 7 Marks. Cloth 8.50 Marks.

This volume of 312 + VIII octavo pages represents a compilation of the work done in the pharmaceutical institute of the University of Berlin during the year 1909, and, with the six preceding volumes, constitutes a record of accomplishment of which any institution might well be proud.

As has been pointed out before the work done in connection with the pharmaceutical institute of the University of Berlin is unique and the institution is not alone a pharmaceutical school and a laboratory for original research, but, to a lesser extent perhaps, also a central station for the control of new remedies and proprietary medicines.

From a practical point of view this activity is by no means the least important of the several activities of the institute and, in the recently published report, readily surpasses all of the other departments in number of communications.

It may be well to add that this particular branch of the activities of the institute is being conducted at the expense of the German Society of Apothecaries and that the work itself has much in common with the work done by the Council on Pharmacy and Chemistry of the American Medical Association. Indeed, the director of the Institute, Prof. H. Thoms, has for some years been affiliated with the Council as a corresponding member and the work of the Berlin Institute is frequently quoted in the pages of the *Journal of the American Medical Association* and has been of practical assistance in the detection of irregularities in connection with European specialties.

While the reports of work done in the institute at Berlin are frequently mentioned or abstracted in this JOURNAL as well as in the *Journal of the American Medical Association* it is perhaps unfortunate that the contributions, as they are gathered together in the volume under discussion, are not more readily available to the average pharmacist in this country.

As an illustration of the varied character of the information that is supplied, and as an indication of the nature of the work that is being done by the men who are officially connected with the pharmaceutical institute of the University of Berlin, it may suffice to enumerate the contents of the volume before us.

In addition to a general review of the new remedies and proprietary specialties introduced in 1909, the book records the examination of 30 new remedies and proprietary specialties and contains in

addition 1 article on the testing of quinine pills, 5 articles bearing on phytochemical subjects, 12 articles of a general chemical character, 12 articles on technical and food products from the colonies, 1 article describing an extraction apparatus for a variety of purposes, and a reprint of a lecture by the director on sources of energy for chemical processes.

In Europe the work done in connection with the pharmaceutical institute of the University of Berlin has served as an incentive for other institutions to follow in the same lines and work of a similar nature is now being done in connection with the pharmaceutical institutes of other German Universities, and also, to a lesser extent perhaps, at similar institutions in Austria, Switzerland, France, and Holland.

With the interest that is being evidenced in the work of the Council on Pharmacy and Chemistry of the American Medical Association, and the evident reawakening on the part of pharmacists to an appreciation of the uses and limitations of official drugs and open formula preparations, we will, in the very near future, no doubt, witness the development of similar work on the part of schools and colleges of pharmacy in the United States. M. I. W.

HANDBUCH DER PHARMAKOGNOSIE. Von A. Tschirch. Mit zahlreichen Abbildungen im Text und auf Tafeln sowie mehreren Karten. Leiferung 19–21. Leipzig: Chr. Herm. Tauchnitz.

Beginning with Part 19, we have the second part of Tschirch's Hand-book, dealing with Special Pharmacognosy. As the pharmacologist desires to know the nature of the active principles of drugs, Tschirch classifies them according to their chemical constituents. The first group considered are the carbohydrates, among which we find Mel, Flos Verbasci, Caricæ, Dactyli, Passulæ, Fructus Juniperi, Fructus Sambuci, Fructus Pruni, Fructus Jujubæ, Fructus Myrtilli, Fructus Rubi Idæi, Radix Liquiritæ, Manna, Saccharum, Amylum, etc., etc.

Each product or drug is considered in detail as follows: Synonyms, etymology, botanical origin, description of the plant yielding the drug, and the diseases which may affect it, cultivation, source, commercial varieties, macroscopic and microscopic description of the drug, chemical constituents, adulterations, historical notes concerning the drug, and a nearly complete citation of the important literature.

The monographs of the different drugs are very complete and while one does find a number of omissions, as for instance under Glycyrrhiza, in the enumeration of other plants containing glycyrrhizin, this is rather to be expected, as the task undertaken by Tschirch is almost superhuman.

The amount of information collated of each drug, the nearly complete citation of the literature, and the numerous excellent illustrations make this work indispensable to both the pharmacist and pharmacologist.

H. K.

PHARMAKOGNOSTISCHER ATLAS. Zweiter Teil der mikroskopischen Analyse der Drogenpulver. Erster Band. 1 Lieferung. Von Dr. Ludwig Koch, Universität Heidelberg. Leipzig: Verlag von gebrüder Borntraeger, 1909.

In this part of Koch's excellent Atlas we find microscopic descriptions of the following barks: Cascarilla, red cinchona, and cinnamon. The illustrations are well drawn and quite accurate. Pharmacists, and particularly pharmacognosists, are indebted to Dr. Koch for giving us such a painstaking and valuable work.

H. K.

THE ECLECTIC ALKALOIDS, RESINS, RESINOIDS, OLEORESINS, AND CONCENTRATED PRINCIPLES. By John Uri Lloyd. Bulletin of the Lloyd Library, No. 12. Pharmacy Series, No. 2, 1910. Cincinnati: J. U. and C. G. Lloyd.

This is a very valuable publication, and there is probably no one living who could present in such a concise and illuminating manner the history of the "Concentration feature of the American Materia Medica" as the author. He says: "It will be perceived that the so-called eclectic resinoids, alkaloids, and resins were introduced into the passing along of the science of pharmacy, materia medica, and medicine of the nineteenth century, much as a foreign body, for a temporary purpose, becomes a part of a structure from which it is afterwards excised, leaving in the end a few remnants only to tell the story of its former usefulness. It is as the superstructure to a bridge that, supporting the incomplete edifice, is vital to its very construction, but yet is finally torn away by its own builders."

In the present volume are excellent portraits and brief biographies of John King, William Stanley Merrell, Alexander Wilder,

William Tully, Grover Coe, Robert Stafford Newton, Edward S. Wayne, Calvin Newton, and John Coakley Lettsom.

This Bulletin of the Lloyd Library will always be consulted by the historical students in pharmacy and medicine with great interest and profit, although the author considers it "as merely an introductory chapter" regarding the record of American materia medica and pharmacy.

H. K.

SERUM DIAGNOSIS OF SYPHILIS and the Butyric Acid Test for Syphilis. By Hideyo Noguchi, Associate Member of the Rockefeller Institute for Medical Research, New York. 14 Illustrations. Philadelphia and London: J. B. Lippincott Company.

"The object of this book," as stated by the author, "is, first, to give a brief yet adequate account of the principles of serum hæmolysis and of the behaviors of the combinations of antigens and antibodies towards hæmolysis, so essential for a proper understanding of the subject, discussing at some length the quantitative relationship of the factors playing a part in these phenomena, an aspect of the subject that has perhaps not received the consideration that it deserves; and, secondly, to give in detail the technic of Wassermann's method and of the method recommended by the author."

The presentation of the subject by the author is logical and unusually clear, so that this work can be used as a laboratory guide by the student and medical practitioner. From the numerous confirmatory results obtained by Dr. Noguchi it would appear that the butyric acid test is a useful addition to the diagnostic methods in the detection of parasyphilitic diseases of the central nervous system and of cerebrospinal syphilis.

H. K.

FUNGOUS DISEASES OF PLANTS. With chapters on Physiology, Culture Methods, and Technique. By Prof. Benjamin M. Duggar, New York State College of Agriculture, Cornell University. Boston: Ginn and Company.

While there are several good foreign books dealing with plant diseases, there has not been available a work which deals with American conditions and takes cognizance of the large number of investigations on plant pathology which have been carried on in this country.

The present book is intended as a general text and reference book for the student and plant producer. In the discussion of each plant disease the following considerations have been kept in view: (1) to describe the pathological effects and other relations of host and parasite; (2) to make clear the life history of the casual fungus; and (3) to indicate the approved or suggested methods of prevention or control.

The illustrations are numerous and excellent. There is also a valuable extensive host index in which is presented in a succinct form all the diseases discussed to which the host plants are subject.

H. K.

PHILADELPHIA COLLEGE OF PHARMACY.

MINUTES OF THE SEMI-ANNUAL MEETING.

The semi-annual meeting of the College was held September 26, at 4 P.M., in the Library. Eighteen members were present. In the absence of the President, Howard B. French, who was in the far West, the Second Vice-President, Joseph L. Lemberger, presided. The minutes of the quarterly meeting held June 28 were read and approved. The minutes of the Board of Trustees for June were read by the Registrar, J. S. Beetem, and approved.

The report of the Committee on Nominations was read and ordered filed. A letter was read from Mr. Samuel C. Henry, who had been nominated to the Board of Trustees, thanking the Committee for the nomination and expressing his appreciation of their action, yet requesting the members present to vote for the other nominees who had previously served as Trustees, as they had served the College faithfully and well.

The names proposed for Honorary Members at the meeting in June and laid over till this meeting were then elected as Honorary Members, as follows: Wilhelm Ostwald, formerly Professor of Chemistry at the University of Leipzig, Germany; Josef Moeller, Professor of Pharmacology and Pharmacognosy at the University of Graz, Germany; H. Wefers Bettink, Director of the Pharmaceutical Institute of the University of Utrecht, Utrecht, Holland; C. E. Bessey, Professor of Botany, University of Nebraska, Lincoln, Nebraska.

ELECTION FOR TRUSTEES.—William McIntyre and William E.

Lee were appointed tellers, who after a ballot was taken, reported the election of E. M. Boring, Theodore Campbell, and Charles Leedom to membership in the Board of Trustees for the ensuing three years.

While the tellers were counting the ballots, Mr. William L. Cliffe informed the members as to the progress being made in preparing for the new course in physical training. The upper floor was almost ready, and when completed would compare favorably with other institutions that had devoted much time to athletics. The Medical Examiner and the Instructor in Physical Training were anxious to do their part of the work for the work's sake and because of their belief in the great value of athletics in educational institutions. The eyes of the students will be especially examined by an expert, without additional cost to the College, and it is expected that this examination of the eyes will prevent much future trouble by an early recognition of eye defects.

Messrs. Lemberger, Kraemer, Remington, and Boring expressed their pleasure at the information given by Mr. Cliffe.

The Chairman reappointed the Committee on Membership, as follows: C. B. Lowe, Chairman, Martin I. Wilbert, Edwin M. Boring, Richard M. Shoemaker, C. A. Weidemann.

Professor Henry Kraemer stated that the report of the delegates to the Pennsylvania Pharmaceutical Association meeting held at Buena Vista Springs, June 28–30, had been overlooked, and in the absence of the Chairman, Dr. C. B. Lowe, be asked to furnish a report for record and that it be recorded as of the minutes of the meeting. Dr. Lowe, later, furnished the report, as follows:

"The recent meeting was one of the most successful on record, the attendance was large, the interest in the meetings well sustained, and the social features most enjoyable. The standing committees presented excellent reports. The Membership Committee reported 136 new members. The report of the Committee on Trade Interest and that on Adulterations were especially noteworthy, as was also that of the Committee to Draft Antinarcotic Laws and the Committee on Legislation.

"The State Pharmaceutical Examining Board, through its Secretary, L. L. Walton, presented a most complete and satisfactory report of the work done by the Board. The Vice-President of the Board, Christopher Koch, reported the efforts made to stop the cocaine and morphine traffic.

"The prize of $20.00 for the best paper read at the previous meeting was awarded to Dr. F. E. Stewart, for his paper entitled 'The Copyright, Patent, and Trade-Mark Question.' A touching memorial session was held for the late Mahlon N. Kline. Several of the members voiced their high esteem of his character.

"Affiliation with the N. A. R. D. was maintained, but the appropriation was cut down in amount.

"The social features were, as usual, of a very enjoyable character.

"The only criticism which can be fairly made was the lack of sufficient time given to the reading of papers and queries. Quite a number of papers were read by title. The discussions on those read were very interesting and profitable. Professor Charles H. LaWall was elected President for the ensuing year. The next meeting will be held at Bedford Springs, June 20–22, 1911."

ABSTRACTS FROM THE MINUTES OF THE BOARD OF TRUSTEES.

June 15.—Fifteen members present.

The Committee on Accounts and Audit reported that they had examined the accounts of the Treasurer, Registrar, and Committee on Publication and found them correct.

The Committee on Instruction presented a supplemental report recommending the appointment of Messrs. Cliffe, Remington, and Kraemer as a Subcommittee on Athletics. The Committee also reported that Professor Moerk had divided the third year class into two sections, arranging them alphabetically, which would prevent considerable annoyance. Owing to increasing work in the Chemical Laboratory, additional assistance was arranged for; and it was recommended that a Department of Physical Culture be organized with William Schleif, Ph.G., M.D., as medical examiner and W. Ward Beam as instructor. The recommendations of the Committee were approved.

The Wiegand Scholarship Fund was reported to be available, and that one student would be named for the session of 1910–11.

The Committee on Announcement reported that Bulletin No. 4, Vol. 2, was in the hands of the printer and would be issued early in July. The Committee asked the opinion of the Board as to the advisability of issuing an edition of the Bulletin in Spanish. The suggestion was received with favor, and the Committee was authorized to prepare a Spanish edition.

The Board unanimously passed a resolution of thanks to be tendered his Excellency, Edwin S. Stuart, Governor of Pennsylvania, for the able and interesting address which he delivered at the Commencement exercises held in the Academy of Music on Thursday evening, May 26. A resolution of thanks was also extended to the Rev. Llewellyn Caley for the services which he rendered upon the same occasion. In appreciation of the very able baccalaureate sermon delivered Sunday afternoon, May 22, by the Rev. David M. Steele, to the graduating class in attendance at the Church of St. Luke and the Epiphany, Thirteenth Street below Spruce, a unanimous vote of thanks was extended Rev. Mr. Steele.

A vote of thanks was extended to Miss Mary Dobbins for the presentation to the College of a picture of the Old Physic Garden of the Society of Apothecaries at Chelsea, England (1750). The picture was much appreciated, and will prove a valuable addition to the collection of the College.

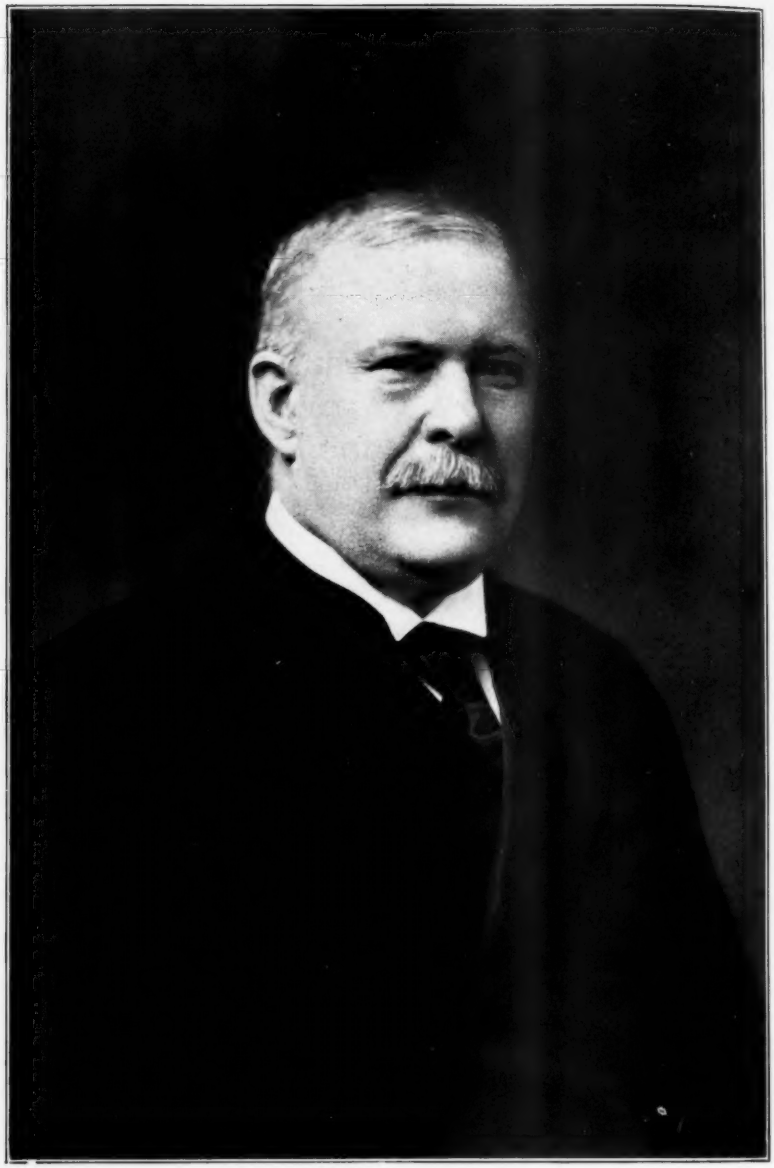
C. A. WEIDEMANN, M.D.,
Recording Secretary.

NOTES AND NEWS.

COMMITTEE OF REVISION.—The vacancy in the Committee of Revision of the U. S. Pharmacopœia caused by the resignation of Professor Edward Kremers has been filled by the election of Professor Solomon Solis Cohen, of Jefferson Medical College, Philadelphia.

INTERNATIONAL EXHIBITION AWARD.—The exhibit of the Wellcome Chemical Research Laboratories at the International Exhibition at Brussels, which, unfortunately, was completely destroyed by fire in August last, has been awarded three grand prizes (Grand Prix) and one gold medal; and for an exhibit at the Japan-British Exhibition held in London during the past summer, one grand prize was also received. When one reflects upon the large number of researches carried on in these laboratories, and as seen in the numerous scientific papers published under the direction of the director, Dr. Frederick B. Power, we are quite prepared to learn of the announcement of these awards.

PHARMACEUTICAL MEETING.—At the first of the series of pharmaceutical meetings for 1910–1911, held on October 13, Dr. E. R. Larned, Special Lecturer on Serum Therapy, Physiological Standardization and Chemical Testing of Drugs of the University of Buffalo, and Director of the Laboratories of Experimental Medicine, Parke, Davis and Co., delivered a lecture on "Serum Therapy, the Prevention of Smallpox and Opsonic Therapy," which was illustrated with a large number of lantern slides. An abstract of this valuable lecture will be published in an early issue of this JOURNAL.



PROF. CARL S. N. HALLBERG
1856–1910.